

Note: Four possible answers A, B, C and D to each question are given. The choice which you think is correct, fill that circle in front of that question with Marker or Pen ink in the answer-book. Cutting or filling two or more circles will result in zero mark for that question.

1-1- **A boy jumps out of a moving bus. There is danger for him to fall:**

- (a) Towards the moving bus
- (b) Away from the bus
- (c) In the direction of motion
- (d) Opposite to the direction of motion ✓

2- **A body is in equilibrium when its:**

- (a) Acceleration is uniform
- (b) Speed is uniform
- (c) Speed and acceleration are uniform
- (d) Acceleration is zero ✓

3- ✓ **The value of $\sin 45^\circ$ is:**

- (a) Zero
- (b) 1
- (c) 0.2
- (d) 0.707 ✓

4- **The speed of satellite nearest to the earth orbit is:**

- (a) 6 Km s^{-1}
- (b) 7 Km s^{-1}
- (c) 8 Km s^{-1} ✓
- (d) 10 Km s^{-1}

5- **Convert 54 km h^{-1} into ms^{-1} :**

- (a) 5 m s^{-1}
- (b) 10 m s^{-1}
- (c) 15 m s^{-1} ✓
- (d) 20 m s^{-1}

6- If the velocity of a body becomes double, then its kinetic energy:

- (a) Remains the same
- (b) Becomes double
- (c) Becomes four times ✓
- (d) Becomes half

7- One mega is equal to:

- (a) 10^3
- (b) 10^4
- (c) 10^5
- (d) 10^6 ✓

8- False ceiling is done to:

- (a) Lower the height of ceiling
- (b) Keep the roof clean
- (c) Cool the room
- (d) Insulate the ceiling ✓

9- One litre is equal to:

- (a) 1 mm^3
- (b) 1 cm^3
- (c) 1 dm^3 ✓
- (d) 1 m^3

10- What happens to the thermal conductivity of a wall if its thickness is double:

- (a) Becomes double
- (b) Remains the same ✓
- (c) Becomes half
- (d) Becomes one-fourth

11- Which of the substance is the lightest one:

- (a) Copper
- (b) Mercury
- (c) Aluminum ✓
- (d) Lead

12- Normal human body temperature is:

- (a) 15°C
- (b) 37°C ✓
- (c) 37°F
- (d) 98.6°C

9th Class 2017

Physics

Group-I

Paper

Time: 1.48 Hours

(Subjective Type)

Marks: 40

(Part-I)

2. Write short answers to any FIVE (5) questions:

(i) Differentiate between atomic physics and nuclear physics.

Ans The study of the structure and properties of atoms called atomic physics while nuclear physics deals with properties and behaviour of nuclei and the particles within nuclei.

(ii) You are fifteen years old. Estimate your age in seconds

Ans

$$\begin{aligned} \text{Age (in years)} &= 15 \\ \text{Days in one year} &= 365 \\ \text{Hours in one day} &= 24 \\ \text{Seconds in one hour} &= 60 \times 60 \\ \text{Seconds in 15 years} &= 15 \times 365 \times 24 \times 60 \times 60 \\ &= 47,30,40,000 \text{ seconds} \end{aligned}$$

(iii) What is meant by least count of vernier callipers?

Ans Vernier constant or least count is the minimum distance that can be measured with the help of vernier callipers.

(iv) Define uniform acceleration.

Ans "A body has uniform acceleration if it has equal changes in velocity in equal intervals of time, however short the interval may be."

(v) What is the difference between scalars and vectors?

Ans A physical quantity which can be completely described by its magnitude is called a scalar.

A vector can be described completely by magnitude along with its direction.

TIPS Solved Up-to-D

(vi) Different

Ans Length

distance between

Displacement

points which h

(vii) Define

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(viii) Write

Ans Friction

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(vi) **Differentiate between distance and displacement.**

Ans Length of a path between two points is called the distance between those points.

Displacement is the shortest distance between two points which has magnitude and direction.

(vii) **Define unit of force.**

Ans One Newton is unit of force is Newton. The force that produces an acceleration of 1 m s^{-2} in a body of mass of 1 kg is called the unit of force. It is represented by (N).

(viii) **Write two advantages of friction.**

Ans Friction enables us to:

1. Write
2. Walk

3. **Write short answers to any FIVE (5) questions: 10**

(i) **What is meant by resolution of forces?**

Ans Splitting up of a force into two mutually perpendicular components.

(ii) **Define axis of rotation.**

Ans Consider a rigid body rotating about a line. The particles of the body move in circles with their centres all lying on this line. This line is called the axis of rotation of the body.

(iii) **Write the mathematical forms of conditions of torque.**

Ans The moment of the force or torque τ is determined by the product of force F and its moment arm L . Mathematically,

$$\text{Torque : } \tau = F \times L$$

(iv) **Define force of gravitation.**

Ans Newton concluded that there exists a force due to which everybody of the universe attracts every other body. He named this force the force of gravitation.

(v) Define satellites and give an example.

Ans Satellites are such objects that revolve around a planet. For example, earth.

(vi) State the law of gravitation.

Ans Everybody in the universe attracts every other body with a force which is directly proportional to the product of their masses and inversely proportional to the square of the distance between their centres.

(vii) Define mechanical energy and give an example.

Ans The energy possessed by a body both due to its motion or position. For example, moving car.

(viii) What is power? Write its unit.

Ans Power is defined as the rate of doing work. SI unit of power watt.

4. Write short answers to any FIVE (5) questions: 10

(i) State Hooke's Law.

Ans Hooke's law states that:

"The strain produced in a body by the stress applied to it is directly proportional to the stress within the elastic limit of the body."

Thus $\text{Stress} \propto \text{Strain}$

or $\text{Stress} = \text{Constant} \times \text{Strain}$

or $\frac{\text{Stress}}{\text{Strain}} = \text{Constant}$

(ii) Define plasma. What is its relation with electric current?

Ans Plasma:

Ionic state of matter is called plasma.

Relation with Electric Current:

Plasma is formed when current flows (passes) through gas.

(iii) Define elasticity.

Ans The property of the solids because of which they restore their original shape when external force ceases to act.

(iv) How many scales are there for the measurement of temperature? Write their names.

Ans Scales of temperature:

There are three scales of temperature:

1. Celsius scale or Centigrade scale
2. Fahrenheit scale
3. Kelvin scale

(v) What is meant by freezing point and melting point?

Ans Freezing Point:

The temperature at which substance changes from liquid to solid.

Melting Point:

Melting point is that point at which a solid starts melting.

(vi) How does cross-sectional area of solid affect thermal conductivity?

Ans Thermal conductivity is directly proportional to the area.

$$\frac{Q}{t} \propto A$$

Greater the area more is flow of heat.

(vii) Define convection.

Ans Transfer of heat by actual movement of molecules from hot place to a cold place is known as convection.

(viii) What is meant by greenhouse effect?

Ans As the concentration of CO_2 in air increases, less heat energy is lost from the surface of the Earth. Therefore, the average temperature of the surface gradually increases. This is called greenhouse effect.

(Part-II)

Note: Attempt any TWO (2) questions.

Q.5.(a) What do you mean by centripetal force? Derive the equation for centripetal force: $K.E = \frac{1}{2} mv^2$

Ans Centripetal Force:

Centripetal force is a force that keeps a body to move in a circle.

Derivation of the equation:

Consider a body of mass m moving with velocity v . The body stops after moving through some distance S due to some opposing force such as force of friction acting on it. The body possesses kinetic energy and is capable to do work against the opposing force F until all of its kinetic energy is used up.

\therefore K.E. of the body = Work done by it due to motion

$$\text{K.E.} = FS \quad (1)$$

$$v_i = v$$

$$v_f = 0$$

As $F = ma$

$$\therefore a = -\frac{F}{m}$$

Since motion is opposed, hence, a is negative. Using 3rd equation of motion:

$$2 a S = v_f^2 - v_i^2$$

$$2 \left(-\frac{F}{m} \right) S = (0)^2 - (v)^2$$

$$2 \frac{F}{m} S = -v^2$$

$$\frac{m}{2} \times \frac{2FS}{m} = v^2 \times \frac{m}{2}$$

$$FS = \frac{1}{2} mv^2$$

$$F S = \frac{1}{2} m v^2 \quad (2)$$

From (1) and (2), we get

$$\text{K.E.} = \frac{1}{2} m v^2$$

(b) A boy throws a ball vertically up. It returns to the ground after five seconds. Find: (5)

(i) The maximum height reached by the ball.

(ii) The velocity with which the ball is thrown up.

Ans

Initial velocity = $v_i = ?$

Gravitational acceleration = $g = -10 \text{ ms}^{-2}$

Time for up and down = $t_o = 5 \text{ s}$

Final velocity = $v_f = 0$

$S = h = ?$

Time for one side = $t = \frac{1}{2} t_o$

$$t = \frac{1}{2} \times 5 \text{ s} = 2.5 \text{ s}$$

(i)

Also know

$$v_f = v_i + at$$

$$0 = v_i - 10 \text{ ms}^{-2} \times 2.5$$

$$v_i = 25 \text{ ms}^{-1}$$

(ii)

We know that

$$h = v_i t + \frac{1}{2} gt^2$$

$$= 25 \times 2.5 + \frac{1}{2} (-10)(2.5)^2$$

$$h = 31.25 \text{ m}$$

Q.6.(a) Define both conditions for equilibrium.
Describe each with one example. (4)

Ans

First condition:

Resultant of all the forces is zero.

$$\Sigma F = 0$$

For example, a book on a table.

Second condition:

Resultant of acting torque is zero.

$$\Sigma \tau = 0$$

For example, a ceiling fan.

(b) A body of mass 50 kg is raised to a height of 3 m. What is its potential energy? ($g = 10 \text{ ms}^{-2}$)

Ans

Mass $m = 50 \text{ kg}$

Height $h = 3 \text{ m}$

$g = 10 \text{ ms}^{-2}$

as

P.E. = mgh

\therefore

P.E. = $50 \text{ kg} \times 10 \text{ m s}^{-2} \times 3 \text{ m}$

= $(50 \times 10 \times 3) \text{ J}$

= 1500 J

The potential energy of the body is 1500 J.

Q.7.(a) Describe and explain kinetic molecular model of matter.

Ans Kinetic molecular model is used to explain the three states of matter -- solid, liquid and gas.

Solids:

Solids such as a stone, metal spoon, pencil, etc. have fixed shapes and volume. Their molecules are held close together by strong forces of attraction. However, they vibrate about their mean positions but do not move from place to place.

Liquids:

The distances between the molecules of a liquid are more than in solids. Thus, attractive forces between them are weaker. Like solids, molecules of a liquid also vibrate about their mean position but are not rigidly held with each other. Due to the weaker attractive forces, they can slide over one another. Thus, the liquids can flow. The volume of a certain amount of liquid remains the same because it can flow hence, it attains the shape of the container to which it is put.

GASES:

Gases such as air have no fixed shape or volume. They can be filled in any container of any shape. Their molecules

(5) have random motion and move with very high velocities. gases, molecules are much farther apart than solids and liquids. Thus, gases are much lighter than solids and liquids. They can be squeezed into smaller volumes. The molecules of a gas are constantly striking the walls of a container. Thus, a gas exerts pressure on the walls of the container.

(b) Normal human body temperature is 98.6°F . Convert it into Celsius scale and Kelvin scale.

Ans

$$T = 98.6^{\circ}\text{F}$$

$$^{\circ}\text{C} = ?$$

$$\text{K} = ?$$

$$^{\circ}\text{C} = \frac{9}{5} (T_{\text{F}} - 32)$$

$$^{\circ}\text{C} = \frac{9}{5} (98.6 - 32)$$

$$\boxed{^{\circ}\text{C} = 37^{\circ}\text{C}}$$

$$T = ^{\circ}\text{C} + 273$$

$$T_{(\text{K})} = 37 + 273$$

$$\boxed{T_{(\text{K})} = 310 \text{ K}}$$